LONGITUDINAL STUDY OF FRUIT AND VEGETABLE CONSUMPTION IN HUNGARY

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Paper prepared for presentation at the 104th (joint) EAAE-IAAE Seminar Agricultural Economics and Transition:
„What was expected, what we observed,
the lessons learned."

Corvinus University of Budapest (CUB)
Budapest, Hungary. September 6-8, 2007

PROBLEM AND OBJECTIVES

Appropriate fruit and vegetable consumption is important in human diet. First question to ask in this case is what we do measure, what the fruit and vegetable consumption data do mean. We need to know how different subcategories build up this category, and if they are the same in different data sources. It is a basic question to ask how fruit and vegetable consumption is measured.

The next question to ask after how much Hungarians consume is to tell how satisfactory the level fruit and vegetable consumption is. What percentage of the Hungarian population is able to meet the minimum and optimum levels of consumption calculated by WHO. So, the next field of study is the position of these products in total food consumption structure.

Consumption of fruits and vegetables in volume was on the same level at the beginning and the end of the 1990-s, despite some ups and downs in between. What changes are hidden behind the stabile consumption? We study this question by analyzing the consumption data in volume and value and the internal ratio of some different fruits and vegetables within the category.

It seems obvious to study the different factors with affect on consumption, but this is going to be done in our next study. We need to cover the seasonal effects, and the behavior of different consumer segments, including the non-consuming segment too. It is well known that most important barrier of consumption increase is the strong seasonal effect in this country, but it seems to decrease in recent years. This is due to higher consumption out of season and stagnating or decreasing consumption in the traditional summer main season.

LITERATURE REVIEW

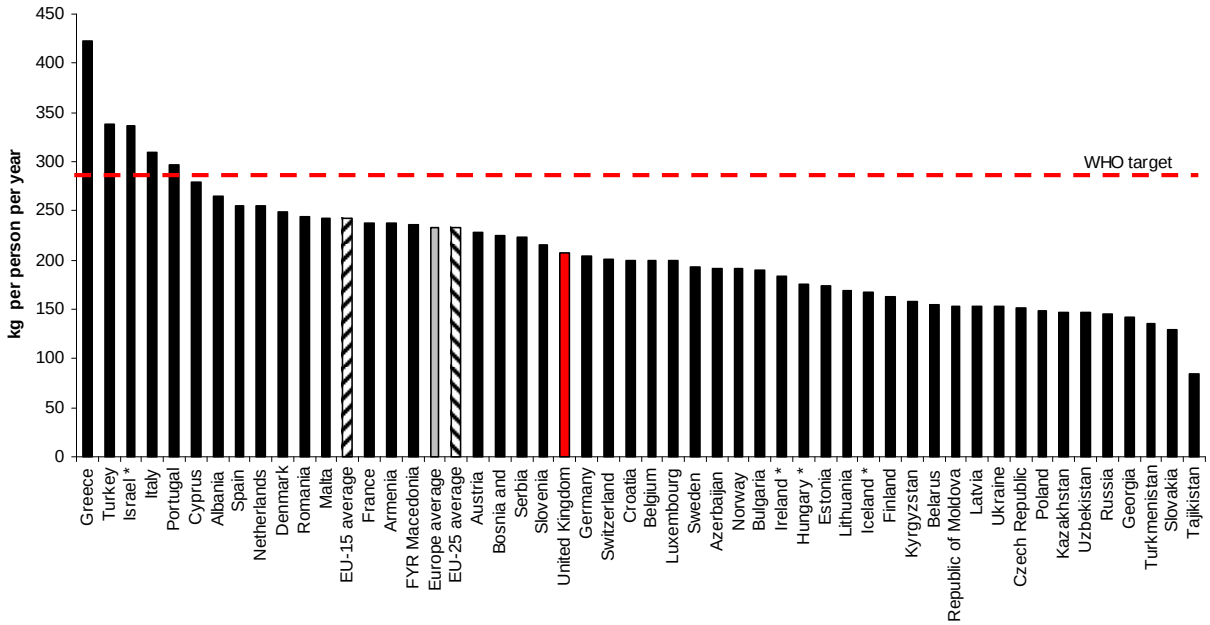
Joint FAO/WHO Expert Consultation on diet, nutrition and the prevention of chronic diseases, recommends the intake of a minimum of 400g of fruit and vegetables per day. This means at least five 80g portions daily, or about 150 kg per person per year, excluding potatoes and other starchy tubers for the prevention of chronic diseases such as heart disease, cancer, diabetes, and obesity as well as for the prevention and alleviation of several micronutrient deficiencies, especially in less developed countries. The number of households not eating the recommended number of fruit servings (2) was significantly lower than vegetables (3 servings) in the studied European countries according to a publication in the British Journal of Nutrition in 2000. This indicated a better situation in case of fruits. The researchers suggested to address the consumers separately for fruits and vegetables and concluded that more focus is needed on vegetables.

Suggested fruit and vegetable intake in the US has been set up following the food pyramid. The famous 5-A-DAY program has been has been launched after an appropriate professional agreement has been reached to support food pyramid (Krebs-Smith and Scott Kantor, 2001, Dixon et al. 2001). Later, it has been improved to propagate diversity and the „Color-Way" has been added to the slogan. Recent studies support the more ambitious Canadian 8-9-A-Day approach, what considers the intake of daily 5 portions as a minimum and it is supported by the WHO too, so the slogan was changed to „5-9-A-DAY" (Figure 1.). The Hungarian Fruit and Vegetable Interprofessional Organization has moderate objectives, promotes 3-A-DAY.

The Produce for Better Health Association and the National Cancer Institute provides studies permanently in this field in the US. The Center for Disease Control and Prevention (CDC) of the Department of Health and Human Services have published a detailed study called "Fruit and Vegetable Consumption Among Adults --- United States, in 2005". The annual Health Survey for England (HSE) covers British fruit and vegetable consumption. It is commissioned by the Department of Health. The National Heart Foundation also issues studies on this topic in the UK. Grigg studied the long term tendencies of food consumption in Western Europe from the end of the XVIIIth century to the middle of the XIXth century (Grigg, 1999). Consumption of fruits and vegetables increased parallel with the improvement of general wealth during this time period, but this increase substantially lagged behind the consumption increase of meat, dairy products, egg, sugar or cooking oils. Earlier Nagy (1978) also emphasized that it is not obvious that fruit consumption increase is parallel with the improvement of level of life.

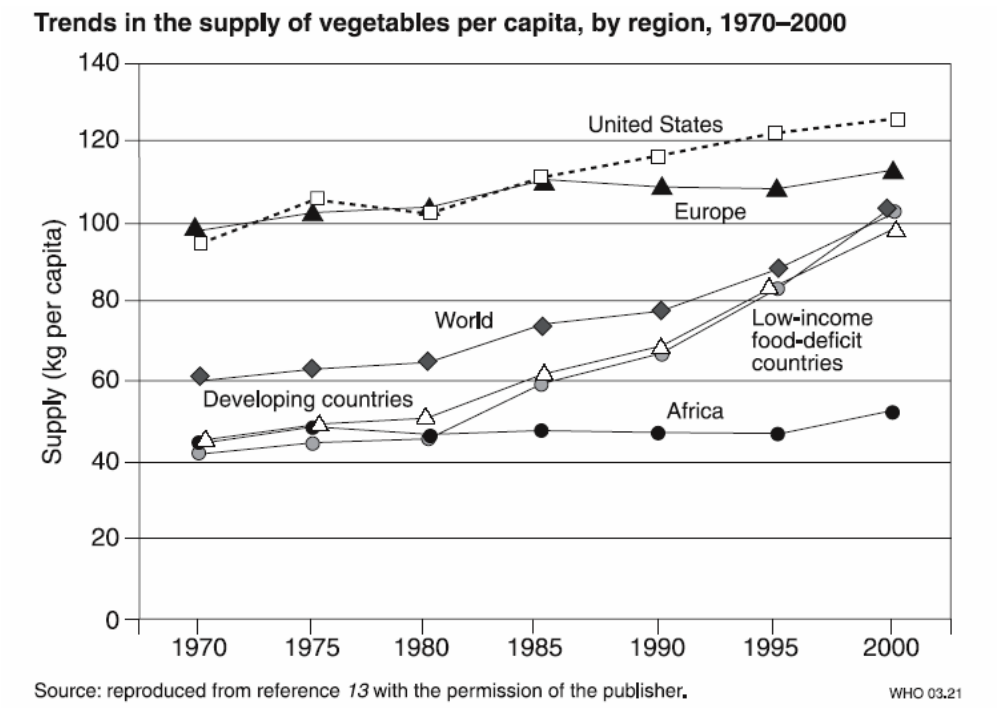
Figure 1.

Availability of fruit and vegetables, 2003, selected European countries, with WHO target



Source: FAO/WHO

Figure 2.



Food consumption of the Hungarian capital before the 2nd. World War can be followed in the publications of the Statistical Bureau of Budapest (Budapest Székesfőváros Statisztikai Hivatala). According to the data from 1939-40 the winter fruit consumption was around the quarter of the summer data. Mediterranean and tropical fruit was an added substitute to the local crop only during the cold months (Buziássy 1944). Average annual fruit consumption in 1936-38. was 64,2 kg/head, and the Mediterranean and tropical fruit consumption was only 8,4 kg/head. (Illyefalvi, 1940). The authors collected data indirectly from general turnover statistics, but by self-filling questionnaire. Vegetable consumption was more then 20% lower at the end of the 1950s, than the average of the 1934-38 years, but the

consumption of fruits increased with almost 30% (KSH 1960). Burgerné showed decrease in fruit and vegetable ratio in the structure of food consumption, rejecting the earlier optimistic predictions in 1979. She wrote that production effects were only partly responsible for the decrease and some answers needed to looked for in consumer behavior too. Consumption was low not due to the inadequate yields, but because the crop was not produced in proper assortment and timing following consumer needs (Burgerné és Kapronczai 1979). The 81kg/head average vegetable consumption between 1960-1969 was growing to 83 kg/head in 1978. The 64 kg/head average fruit consumption between 1960-1969 was between 72-75 kg/head in the 1970-78 period. On longer time frame, between 1880 and 1970, vegetable consumption decreased with its 1/3-d (Balassa 1997). But calculating the fruits and vegetables together on long term, consumption has reached the level of the 1880s during the 1960s (Table 1.).

Table 1. Annual consumption between 1880 and 1960, kg/head (annual averages)

Annual averages of fruit and vegetable consumption	1880-1884	1924-1928	1934-1938	1945-1946	1950-1955	1960
	131	80	95	70	104	139

Source: Zaffir, 1985: 16

Besides the few longitudinal studies, the research on effects of different factors and the segmentation of consumers on fruit and vegetable consumption has huge literature. Hungary has joined the bandwagon recently (Lehota 1995, Horváth et al. 1997 és Tamuset al 1999). The GfK Hungárai Market Research Institute have published a study in 2003 and segmented consumers according to the consumption frequency of 34 foods, including fruits and vegetables. They have depicted the segments following their socio-demographic characteristics. This study was made following international company standards, so it can be compared to other studies abroad and can be repeated. These segments resemble to a great extent to Grunert's Danish segments. It is important to add, that the „conservative" or „traditional" segment consumes less than the average fruits and vegetables in Denmark, but more in Hungary.

Table 1. Consumption of some foods of the segments of GfK Hungária, 7=every day, 3,5=several a week, 1,0= once a week, 0,5=once in 2 weeks, 0,1=rarely

Food	Total	Scantily eating	Traditionalist	Inordinately eating	Hesalth oriented	Volume eaters	Conaseurs
	n=987	n=133	n=333	n=124	n=159	n=160	n=91
Traditional, boiled soups	4,7	4,1	5,8	3,9	4,8	3,4	4,6
Vegetable	3,6	1,8	4,3	3,2	4,3	3,7	3,3
Fruit	4,0	1,7	4,7	3,6	4,6	4,5	3,6
Salad	2,1	0,5	2,3	2,2	2,1	2,6	2,6

Source: GfK Hungária, 2001

METHODOLOGY OF STUDIES

Volume of fruit and vegetable consumption per head can be shown by two statistical data. One is the micro-statistical data – the household budget survey of the Hungarian Bureau of Statistics – the HBS. It only covers the food consumed in the given household. The other one is the macro-statistical calculation – shortly MACRO – involves the food consumed outside the households too. This data is used in the FAO yearbooks and reports.

The household budget surveys cover processed food consumption too, besides fresh fruit and vegetable. They are taken into account in consumed state in contrary to MACRO where the fresh content is calculated and are involved as raw material. Therefore and because of other reasons the macro-statistical calculation, the MACRO and the household budget survey, the HBS can not be compared directly. HBS is made by confessing consumption in a diary, and the consumed volume of food is estimated with mistake by the respondents, despite that only one month is studied in case of every household in every year to make the work for the respondents easier. Other difficulty is the estimate of food consumption from own production, mostly in case of those households which produce food partly for the market. It is a substantial volume, so it can not be neglected. The expenditure part of the household budget survey diary has the following categories: expenditures (bought consumption) and own produced consumption what involves the monthly value of own produced products and food given to other household as gift too.

The HBS has the following sub-categories in case of fruit and vegetables. Vegetables include fresh vegetables and vegetables for cooking and processed vegetables. Fresh vegetables and vegetables for cooking: cabbages, kale, lettuce, mushrooms, tomatoes, carrots, parsley roots, cucumbers, onions, green beans, peas, wax peppers (paprika), other fresh vegetables The rich in starch peas and beans are suggested to belong to staples and not vegetables by FAO/WHO. Traditionally the early potatoes belonged to vegetables in Hungary too. Sweet corn is an open question. World wide problem of measuring methodology of fruit and vegetable intake has been studied by Agudo in 2004 in a WHO research paper. Effectiveness of different methodologies has been studied by Puska (2004), Thompson et al. (2002) and Field et al. (1998). Eldridge et al. (1998) have published the differences among three different measurement methods. Processed vegetables: pickles, sour cabbages, processed green beans and peas, and other processed vegetables. The fruit category has the following sub-categories: fresh local fruits, processed fruits, fruit and vegetables juices, fruit

concentrates, Mediterranean, and tropical fruits. Fresh local fruit category consists the following: apples, peaches, apricots, cherries, watermelons, cantaloupes, strawberries, raspberries, red currents, pears, sour cherries, plums, table grapes, and other local fresh fruits. Consumption of high in starch walnut, almond, and hazelnut is so low, and their other health effects are so positive that they are included. The fruit and vegetable juices, syrups and concentrates make a so complex category, that the answers of the respondents in the questionnaires should be studied with suspicion. Further details of these should be made clear when these definitions are set. These are usually consumed out-of-home and are not involved in household budget survey (HBS) in volume, just only in value. We are not able to show the volume of out-of-home fruit and vegetable consumption, but we can emphasize its importance. Private guests, and visitor meals, HoReCa, workplace meals, school meals, and free social food programs to the needy can be mentioned here.

Advantage of HBS is that the data is from the „first hand", from the filled household diary. The respondents need to answer known in advance and well defined questions. The data suffers lest bias during processing comparing to MACRO data which comes from several kind of sources. It is important to see, that the majority of local fruit is consumed fresh. It is also an advantage, that the number of respondent is high, 10 thousand households in 2001 for example. But, one household fills the diary only for one month long, in different month every year and the households are changed and substituted with a new one after a given time. This means the actual sample is less, but there is less burden on the respondents, so they do a better job answering the questions. The respondent writes into the diary the food the household bought or produced when filling the household consumption diary. The fresh volume of bought and home processed fruit and vegetable is written into the diary, so the really consumed volume of processed products is different than the published data. Data does not cover the losses during in-home processing or even during fresh consumption, for example the seeds of peaches, or the pill of watermelon. So, the real consumed volume is lower. The fruits and vegetables written into the diary are summarized and categorized in the Hungarian Bureau of Statistics later. The earlier mentioned fruit and vegetable categories are calculated this way.

The macro-statistical data, the MACRO contains the consumption of foreign tourists coming to Hungary too, besides the consumption of local people. The consumption of Hungarian tourists abroad is not involved is this data. It does not care about the import and export done by tourism and personal export and import. Calculation of food balance is the following:

(Production)+(Import)-(Export)-(Losses)±(End-of-the-year-stock-in-storage)-(Non-food-use)=Local-consumption

This calculation takes into account the changes in stock at the end of the year, but does not involve the losses during processing, the decayed, and therefore thrown into the garbage products, and the stock in processing plants at the end of the years. It just follows the product to process to the gates of the factories. The different parts of this formula are made by agricultural estimate and can be found in the agricultural yearbooks. These data try to reach consumption from the direction of production. They are in the FAO yearbooks under the name of „supply". Vegetables are: cabbages, kohlrabi, carrots, parsley roots, radish, onions, garlic, lettuce, cauliflowers, spinach, cucumbers, pumpkins, green beans, peas, tomatoes, wax peppers (paprika), bell paper, sweet corns, mushrooms, and other vegetables. Fruits: local fruits, plus Mediterranean and tropical fruits. Local fruits: apples, pears, cherries, sweet cherries, plums, apricots, peaches, gooseberries, red currents, black currents, cantaloupes, watermelons (from 2000 vegetable), raspberries, strawberries, table grapes, and others. Mediterranean and tropical fruits: coconuts, banana, date, figs, pineapples, oranges, tangerines, lemon, lime, grapefruit, kiwi, and others.

There have been major and important methodological changes in macro-statistics (MACRO) in 2000, what had limited effect in micro-statistics (HBS). Fruits and vegetables have been calculated is fresh volume in export and import statistics from this time, following EU expectations, in contrary with the earlier practice. Consumption data between 1990 and 2000 has been corrected backwards based on the data of the 2001 census. We use only corrected data in this paper. Watermelon has been given to the category of vegetables instead of fruits from 2000 (HBS, 2004). One can compare annual consumption data only with care in these years. Studied periods in this paper in case of fruits and vegetables differ because of methodological differences. Production data of vegetables can be followed from 1995 and from 1994 in case of fruits given by the product council. The category of processed vegetables and fruits has been changed in 2004 (juices, drinks and concentrates), so the studied period in this paper is 1994-2004.

Next source of data is GfK Hungária Market Research Company. Two parameters have been measured in case of fruits and vegetables: the frequency of consumption and the popularity. Only the „fruit" and „vegetable" subcategories were given to the respondents in the questionnaire, and these were not divided further, like apple, pear, etc. There were different questions to fruit yogurts, potato, frozen products, non-carbondioxid juices, and salads. We added salads and non-carbondioxide juices to fruits and vegetables when we measured the frequency of consumption. Respondent was free to add canned and dried products to fruits or vegetables if s/he found it important. The diagram shows what % of respondents like and how often they consume a week fruits and vegetables. Fruits are measured from 1997. Collection of data is made by personal interviews in 1000 households, and the responding households are rotated periodically.

Table 2. Categories for the calculation of frequency, for weekly consumption of vegetables, fruits, salad, and non-carbonated fruit juices

Possible answers in the questionnaire	Values given to the answer
1. Almost daily	7

2. Several times a week	3,5
3. Around once a week	1
4. Once in every two weeks	0,5
5. More rarely	0,25
6. Never	0

Source: GfK Hungária

Retail sources of fruit and vegetable for consumers can be studied in the „Shopping Monitor" database of GfK Hungária Market Research Company. 970 adult respondents explain their buying sources and opinion about different retail options. The new nationally representative data base is available in every 2 years.

FRESH VEGETABLE CONSUMPTION

The consumption of fresh vegetables was between 48 kg/head and 53 kg/head in 1995-2004. Consumption was 59 kg/head in 1993 and it decreased in every year till it reached the bottom in 1997 with 51 kg/head. It increased than a little bit and than stagnated. Consumption in 2004 was the same than in 1997. Slight decrease can be seen as a whole in the period, what continued in 2005 (Figure 1.). We can see also the major decreases in consumption in years with low local crop. Pearson correlation between local vegetable production and consumption is 0,7.

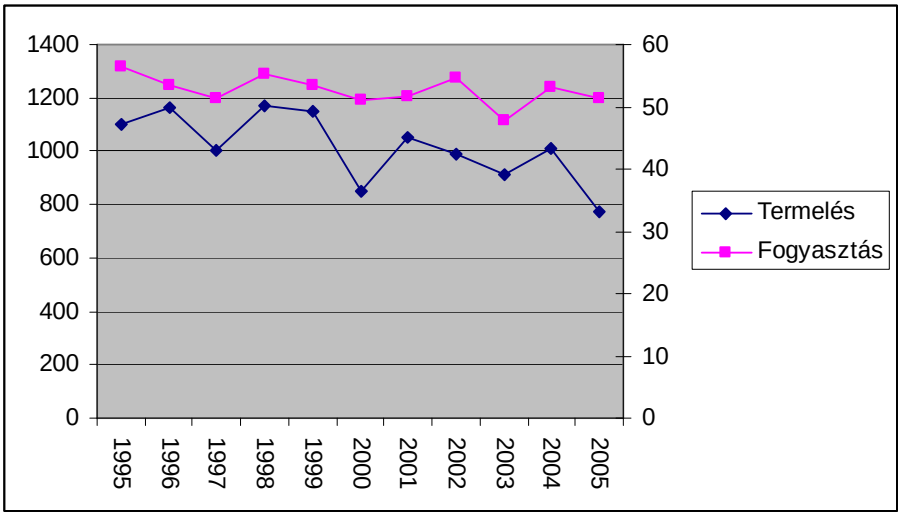


Figure 1. Consumption and production of fresh vegetables, 1995-2005. Production (Termelés) = blue, in 1000t. Consumption (Fogyasztás) = pink, in kg/head/year

Popularity of vegetables increased gradually and in contrary to the number of consumption occasions, what decreased (Figure 2). Popularity over 90% is extraordinary good and it is similar to the data of chocolate. Paisley have shown the „should syndrome" in case of produce by focus group discussions (Paisley, et al, 2001). Participants have mentioned several times that they know that more fruits and vegetables should be eaten, what means positive moral attitude.

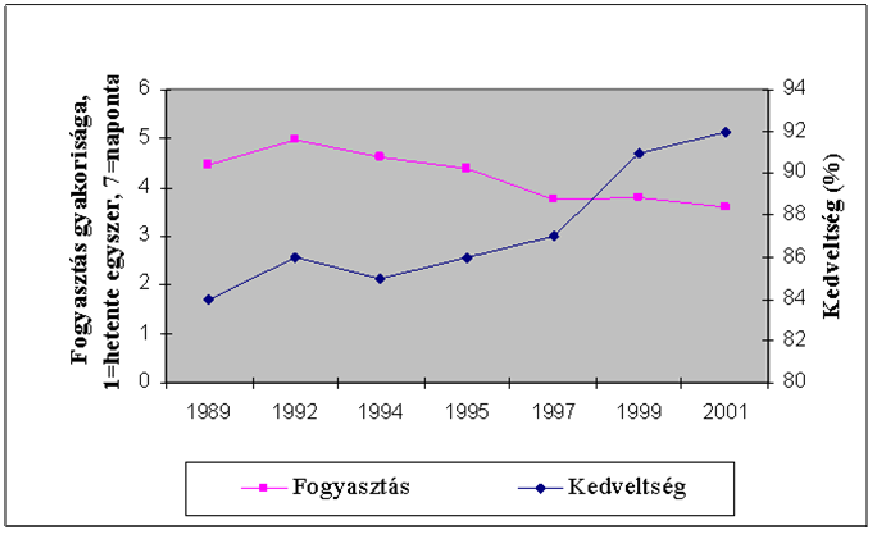


Figure 2. Frequency of consumption and popularity of fresh vegetables. Popularity (Kedveltség)= blue, in %,

Frequency of consumption (Fogyasztás)= pink, 1= once a week, 7= daily. Source: GfK Hungária

90% of the fresh vegetable volume was produced in 2004 compared to 1994 in Hungary, and consumption was also 10% lower in volume and value too. Nominal price index increased 2,5 times, but taking into account inflation the real price of vegetable remained on the same level (Table 3). The more or less parallel tendency of production and consumption is valid only in case of „all fresh vegetables" category. Otherwise consumption of different products shows very weak correspondence with their local production.

Table 3. Price and consumption indexes of vegetables, 1995-2004

Vegetables	Price and consumption indexes, 2004 (1994=100)			
	Real Price Index	**Consumption in Real Value**	**Consumption in Volume**	**Nominal Price**
Cabbages, kale	0.77	1.05	1.01	2.00
Tomatoes	0.88	1.04	1.00	2.29
Carrots, parsley roots	0.87	0.96	0.96	2.25
Cucumbers	1.10	0.85	0.73	2.85
Onions	0.85	0.86	0.94	2.20
Green beans	1.03	0.6	0.65	2.66
Peas	1.55	0.65	0.70	3.60
Wax peppers, paprika	1.04	0.99	1.13	2.69
Fresh vegetables average	1.01	0.88	0.89	2.57
Processed vegetables	0,92	1,20	1,38	2,38

Source: HBS, HSS

Table 4. Consumption of vegetables, internal ratio in volume and value

Vegetables	Ratio in fresh vegetable consumption (Annual fresh vegetable consumption =100%)			
	Volume		Value	
	1993	2005	1993	2005
Cabbages and kale	13,5	15,2	8,1	9,8
Lettuces	1,6	1,0	3,0	3,9
Mushrooms	1,6	1,6	5,4	4,2
Tomatoes	13,1	14,6	12,9	15,4
Carrots, parsley roots	14,7	15,7	16,9	18,8
Cucumbers	11,2	9,1	8,7	8,6
Onions	15	15,6	10	10
Green beans	3,6	2,6	4	2,8
Peas	4,1	3	4,4	3,3
Wax peppers, paprika	11,4	12	14,6	16,6
Fresh vegetables in all vegetables	91,8	88,5	85,1	77,2
Processed vegetables in all vegetables	8,2	11,5	14,9	18,6

Source: 1993-2003 HBS, HBS

Ratio of processed vegetables was 8,2% in volume in total vegetable consumption in 1995, what increased to 11,5% to 2004. This ratio increased from 15% to 18,6 in value (Table 2). But this lags behind the data of the 1970s. 27% of whole consumed vegetable category was processed (frozen and canned) in 1975 (Burgerné 1979: 66). It can be seen in the Table 3., that the consumption of fresh vegetables decreased in volume and value and the same data of processed vegetable increased. But, price index changed in the opposite direction. Prices of fresh vegetables increased largely and their price index is above the processed vegetables', what actually remained on the same level. Despite, processed vegetables still have only minor effect on the consumption of the total vegetable category in volume and value.

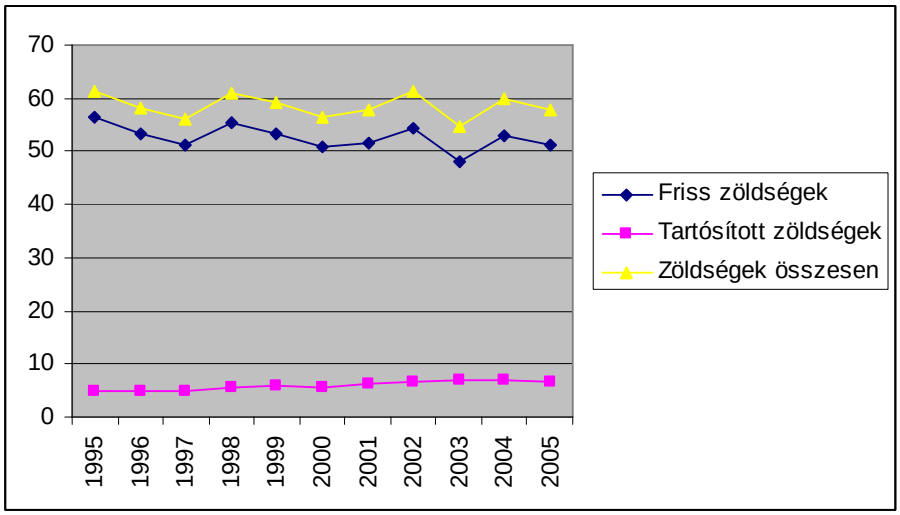


Figure 3. Consumption of fresh, processed and the whole vegetable category, kg/head/year, between 1995 and 2005. Fresh(Friss)=blue, Processed(Tartósított)=pink, Total vegetables (Zöldségek összesen)=yellow.

FRESH FRUIT CONSUMPTION

Total annual fresh fruit consumption, local and Mediterranean and tropical fruit all together was more than 52 kg/head in 1994 and decreased gradually since. Due to the bad financial situation of the consumers and the general state of agriculture this data reached its bottom in 1997 with 40 kg/head consumption. Than it began to increase, but this uplift did not last long and the growth stopped in 1999. We consumed the same volume of fruits annually in 2005, than in 1995 (44 kg). We can see that not the consumption of fresh vegetables, nor the consumption of fresh fruits did not increase between 1994 and 2004, while the index of real income per head was 1,25 in this time period. .

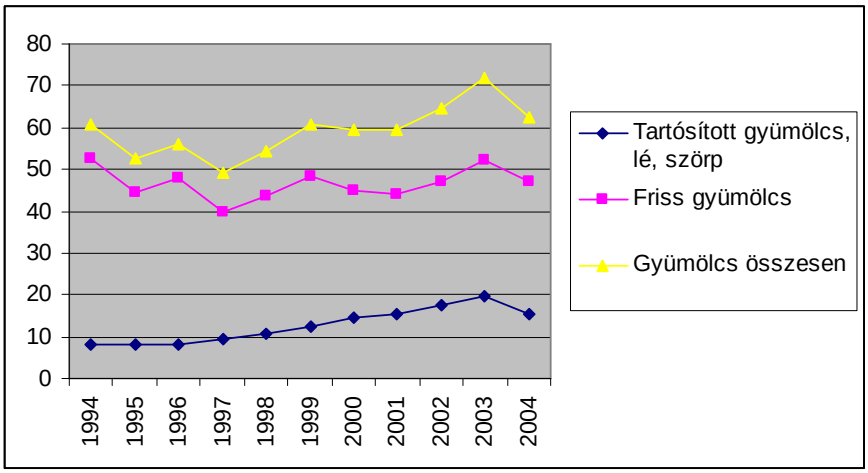


Figure 4. Consumption of fresh and processed fruits and the whole fruit category in volume between 1994 and 2004, kg/head/ year. Fresh (Friss)=pink, Processed (Tartósított)=blue, Total fruit(Gyümölcs összesen)=yellow

Frequency of fresh fruit consumption was stabile during the measure 3 years, but the still high popularity was even further increasing.

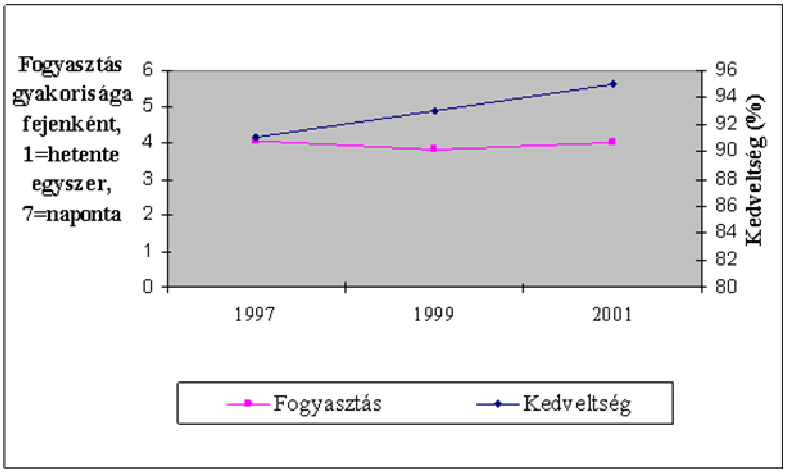


Figure 5. Frequency and popularity of fresh fruit consumption Frequency(fogyasztás)=pink, Popularity(kedveltség)= blue. Source: GfK Hungária

In case of fruits the most is consumed from apples, than watermelon, with around the half of the previous, and the next are table grapes and peaches with also the half of the previous. Consumption of sour cherries is also above 2 kg/head/year, and the rest of the category is under this volume. Consumption of fresh fruits decreased in volume and value (Table 3.), despite that it's real price index decreased also.

Table 2. Fruit consumption and prices

Fruit	Price and Consumption Indexes, 2004 (1994=100)				
	Real Price Index	**Consumption in Real Value**	**Consumption in Volume**	**Nominal Price**	**Production**
Apples	0.80	0.75	0.85	2.65	1.1
Cherries	1.25	0.65	0.58	4.16	0.6
Sour Cherries	1.05	0.64	0.62	3.48	0.4
Plums and prunes	0.55	0.63	0.95	1.84	0.6
Peaches	0.59	0.89	1.22	1.95	1.7
Table grapes	0.73	0.74	0.69	2.43	/
Pears	1.05	0.85	0.87	3.49	0.4
Apricots	0.72	0.72	0.92	2.41	1.3
Watermelons	0.66	0.62	0.9	2.18	2.7*
Fresh local fruits average	0.82	0.72	0.84	2.73	
Medt. and Trop. fruits		0.78	1.14		

*Watermelon production from 1995

Apple and watermelon dominate consumption of fresh fruits (Table 6). The ratio of apples was around 30% between 1993 and 2005. The ratio of apples in volume is 9% lower than in value and this difference is gradually decreasing. Ratio of watermelon in consumption reached its bottom in 1997 (10%) and is increasing since. It was above 15% in 2005.

Table 3: Structure of fruit consumption

Fruit	Ratio in total fresh fruit consumption (Total annual fresh fruit =100%) %			
	Volume		Value	
	1994	2004	1994	2004
Apples	30.8	29.1	19.9	19.4
Watermelons	15.4	14.3	8.1	6.5
Peaches	5.1	7.0	7.5	8.7
Table grapes	7.4	5.7	6.6	6.3
Sour cherries	5.5	3.8	4.9	4.1
Plums	3.8	4.0	3.0	2.5

Pears	2.9	2.6	3.1	3.5
Cherries	4.6	3.0	4.7	4.0
Apricot	2.5	2.6	3.1	2.9
Strawberry, raspberry, current	2.5	2.6	5.8	6.4
Cantaloupe	1.7	1.3	1.2	1.1
Other local fresh fruits	0.6	1.7	0.9	3.2
Mediterranean and tropical fruits	17.3	22.1	31.1	31.6
Total fresh fruits	100	100	100	100
Ratio of processed fruits in total fruits	13.6	24.6	24.8	34.2
Ration of fresh fruits in total fruits	86.4	75.4	75.2	65.8

Watermelon must be emphasized among fruits because of two reasons. One is because its real and nominal price index was almost the lowest in the fresh fruit category. Second, because it was the only product among fruits and vegetables with increasing production and consumption after 1997. Watermelon production more than tripled, its consumption in volume doubled, but consumption in real value increased just with 30% between 1997 and 2004 (Table 5.).

Table 4: Watermelon 1997-2004

2004 (1997=100)	Nominal price	Real price	Consumpt. in Nominal Value	Consumpt. in Real Value	Consumption volume	Production	Ratio in Volume	Ratio in Value
Watermelons	1.1	0.6	2.4	1.3	2.0	3.3	1.7	1.4

Ratio of processed foods in total fruit consumption in value graw from 25% to 34%, and in volume from 14,6% to 24,6%. This is not surprising, because the price index of fruit juices is lower that the fresh fruits' price index (Table 6.). Price index increase of processed fruit, juice and concentrate is substantially higher than what is measured in real value.

Table 5. Consumption and consumption price indexes of fruits and vegetables in (1993=100), in consumption volume

Products	Consumer Price Index, 2004 (1993=100)	Real Price Index 2004 (1993=100)	Consumption Index, 2004 (1993=100, volume)	Consumption Index in Value
Fresh local and import fruits	3.07	0.921	0.89	0.77
Fruits and vegetables juices, concentrates	2.291	0.688	-	1,76
Processed fruits	2.657	0.8	-	2.44
Processed fruits, juice, concentrate	-	-	1.84	1.21

Source: HBS, Statistical Pocketbooks

* Processed fruit, juice, concentrate category till 2003

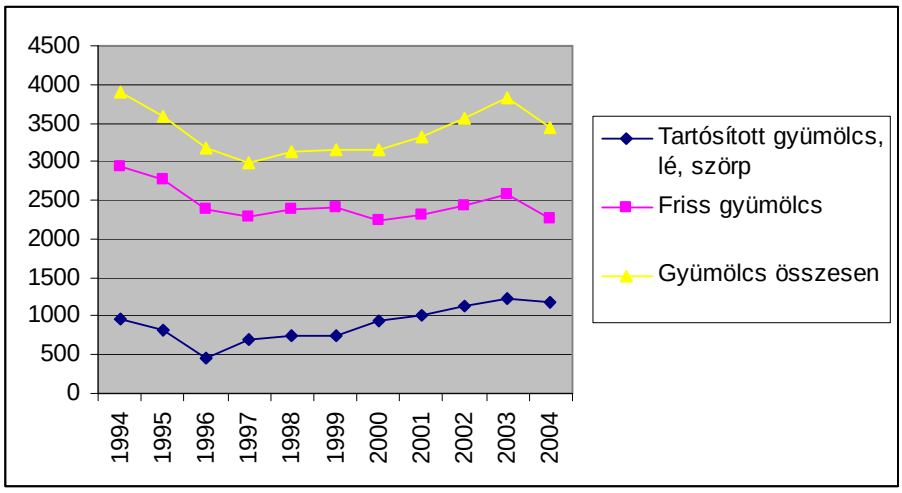


Figure 2: Consumption of fresh and processed fruits and the total fruit category in value, HUF/head/ year, between 1994 and 2004. Total fruit (Gyümölcs összesen)=yellow, Fresh (friss)=pink, Processed (Tartósított)=blue

Ratio of in-home processing decreased in total consumption between 1997 and 2002 from 41% to 36% in case of vegetables and from 35% to 25% in case of fruits. We have shown earlier that the ratio of processed products in total fruit and vegetable consumption increased. The ratio of in-home processing decreased parallel with that.

Table 9. Ratio of bought and own produced products in total fruit and vegetable consumption, measured in value

	Ratio of bough and own produced consumption, %					
	Vegetables			Fruits		
	1993	1997	2002	1993	1997	2002
Bought	60	59	64	69	65	75
Own production	40	41	36	31	35	25
Total	100	100	100	100	100	100

We have shown in details that consumption of processed fruits and vegetables is increasing, but still this subcategory has minor effect on the total fruit and vegetable consumption. Ratio of bought products is gradually growing within this product group to the debit of in-home processing.

SUMMARY

Methodology of statistical data collection and processing play an important role in the international comparison study of fruit and vegetable consumption. Further harmonization work is to be made by international professional organizations and local statistical institutes in this area. Major and important changes were made in statistical survey methodology of fruit and vegetable consumption in Hungary too, during the process of joining the EU. This makes comparison in time difficult.

30% of Hungarian population meets the 400g/day minimum consumption level set by the World Health Organization and supported by FAO. 14% of the Hungarians consume fruit and vegetable 3 times a day what is communicated by the Fruit and Vegetable Product Council. Hungary is under the European average in this case. Health consciousness is not primary related to fruit and vegetable consumption in this country. 12% of the population said they take into consideration the healthy diet, but only 23% of these people consumed at least 3 times a fruit and vegetable. There was contradiction between consumption and moral attitude towards these products. We consume them less frequently, but their popularity is high, and sometimes even increasing.

We found important differences among products when we studied the category. Looking at the changes in share of different products within consumption from 1993, we can see that the consumption structure of vegetables is stabile, but it is changing every year in fruits. We agree with earlier studies that suggested to address the consumers separately for fruits and vegetables and emphasized that more focus is needed on vegetables. The two dominant products in case a fruits, apple and watermelon is has higher share in consumption, that onion and carrot in case of vegetables. Processes fruits have more effect on consumption in case of fruits, than processed vegetables on total vegetable consumption. Consumption of most vegetables changes every year, but they show a gradual decreasing tendency. These are cucumber, green bean, cabbage, kale in vegetables, and pear, sour cherry, plum and cherry in fruits. Consumption of watermelon and Mediterranean and tropical fruits is increasing since 1997.

Consumption of processed fruits and vegetables increased in recent years, but still this subcategory has minor effect on the total fruit and vegetable consumption. Ratio of products bought in retail is gradually growing within this product group to the debit of in-home processing.

It is important to add, that the „conservative” or „traditional” segment consumes more fruit and vegetable than the average in Hungary.

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